TITLE OF THE INVENTION

METHOD, IN PARTICULAR FOR FEEDING A CIGARETTE STRAND MACHINE AS WELL AS A DISTRIBUTOR DEVICE, IN PARTICULAR FOR CARRYING OUT THE METHOD

INVENTORS

Franz-Peter KOCH
Stephan STUDT
Dr. Hans-Heinrich MÜLLER
Reinhard STÜBER
Jörg TOBIAS

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CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority under 35 U.S.C. § 119 of European Patent Application No. 03 09 0021.1 filed January 28, 2003, the disclosure of which is expressly incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The invention concerns a distributor device, in particular for loading a continuous cigarette-making machine. The distributor device essentially includes an input device for the input of a product stream, a preliminary distributor for distributing, measuring out and loosening the product stream, a store for receiving the product stream, and a conveying element for transporting the product stream from the store to an accumulating shaft. Optionally, in front of or behind the accumulating shaft in the direction of transport of the product stream a sifter is arranged for the separation of fractions of the product stream which are to be processed and not to be processed.

[0003] Further, the invention concerns a method, in particular for loading a continuous cigarette-making machine, that includes introducing a product stream into a distributor device by an input device, distributing, measuring out and loosening of the product stream by a preliminary distributor, storing the product stream in a store, transporting the product stream by a conveying element from the store to an accumulating shaft or a sifter, and sifting the product stream in the sifter optionally before or after feeding into the accumulating shaft.

2. Discussion of Background Information

[0004] Distributor devices serve to measure out and sift the tobacco which is usually delivered to them by an air stream. From the sifted material, one or more tobacco strings are formed, which are then delivered to a continuous cigarette-

making machine mounted behind. Tobacco strings which are to be processed into cigarettes or the like usually consist of a tobacco mixture of different tobacco components or varieties. However, frequently other components which affect the taste or the quality of the cigarette, e.g. cloves, form part of the product stream as well. In known methods, the product stream which is required to manufacture the cigarettes or the like is already finally merged and mixed before entry into the distributor device, and introduced into the distributor device by an input device which is appropriately formed from one or more loading chambers. Upon request from a preliminary distributor mounted behind the input device the whole contents of the or each loading chambers fall by the preliminary distributor as a product stream into a store. At least the tobacco components are measured out and loosened on the way into the store. From the store, the store contents, i.e., the product stream of individual tobacco components and additional components that is finally formed before entry into the distributor device, is delivered in small discrete units on the principle of first in, first out by a conveying element. The product stream is optionally conveyed to an accumulating shaft and then to a sifter, or *vice versa*, before the sifted product stream is delivered to a continuous suction conveyor or the like to form one or more tobacco strings. In the sifter, the fractions of the product stream suitable for processing, e.g. the cut tobacco, are separated from the fractions not suitable for processing, e.g. the ribs or other foreign bodies.

[0005] All known distributor devices and methods which are used for loading a continuous cigarette-making machine do however have the drawback that the tobacco varieties and possible additives or components must be mixed before the distributor device, which prevents individual and flexible merging of the product stream. Also, it is disadvantageous that the complete product stream formed from different components, namely tobacco components and additives, at least partially segregates during transport by the distributor device. For a better understanding, at this point the principle of sifting will be explained in more detail. Sifting is usually

effected in a sifting zone in which an air stream flows in the direction of transport in an almost closed circuit. The air stream or flow rate is selected/adjusted in such a way that light fractions of the product stream, that is, those suitable for processing, also referred to as the "wanted" tobacco fraction, are directed or guided in the direction of the continuous cigarette-making machine, while heavier fractions, that is, those not usually suitable for processing, e.g. the ribs of the tobacco leaves, stones, plastic particles or other foreign bodies, fall down by force of gravity and against the air stream and are carried away. During loading of the continuous cigarette-making machine by the traditional method or with the traditional distributor device, segregation takes place due to the fact that, e.g., cloves, which have a substantially higher weight than the wanted tobacco fraction, are sorted out in the sifter, i.e. sifted out, and removed from the product stream and so only partially delivered for actual string manufacture, or no longer delivered at all. As a result, a non-homogeneous product stream is produced, and the product stream no longer has the desired mixture.

[0006] Furthermore, it has happened that tobacco residues which are produced during actual tobacco string manufacture and which have already been sifted, e.g. so-called excess tobacco, are sifted again within the distributor device upon recirculation, which is not economical and increases the load on distributor devices.

SUMMARY OF THE INVENTION

[0007] Therefore, the present invention provides a flexible and economically advantageous distributor device which is suitable for producing a homogeneous product stream capable of individual design. Further, the present invention provides a method that ensures the production of a homogeneous and individually mixed product stream.

[0008] According to the invention, a distributor device of the present invention includes the above-noted features of the distributor device discussed above, and further includes that the distributor device comprises, in addition to the input

device, at least one further external delivery device for the delivery of at least one further component into the distributor device or into the product stream. The delivery device is arranged between the store and the sifter in the direction of transport of the product stream. As a result, in a surprisingly simple and particularly effective manner there is provided the possibility of adding at least one additive or component to the product stream within the distributor device and mixing it with the product stream. Due to the additional external delivery device, therefore, e.g., different tobacco varieties can also be mixed directly within the distributor device. Also further additives, e.g., cloves, dust aggregates, etc. can be mixed with the product stream within the distributor device. In other words, the external delivery device does not mean a recirculation device within the distributor device, e.g. the recirculation of excess tobacco to the store for receiving the product stream, but instead a supply of any components from the outside to the product stream. Due to the fact that the delivery device is arranged between the store and the sifter, the product stream can be made particularly individual and economically advantageous, because introduction of the or each additional component can take place at different positions preventing e.g. segregation or double sifting.

[0009] In a preferred embodiment of the invention, the sifter has at least two approaches. As a result, even more individual mixing of product stream and additional components is possible. Thus, for example, there arises the possibility of delivering components to the sifter in such a way that they are not sifted very much, leading to a relief of the load on the sifter. This can also be, e.g., already sifted tobacco, such as, e.g., expanded tobacco. However, components which are not to be sifted out at all can be added, too. This applies to, e.g., the above-mentioned cloves. Conversely, of course, delivery of components at a different location of the sifter is also possible for those components which are to be sifted particularly well. Due to the plurality of approaches, segregation can also be

avoided in an effective manner by conducting the heavier components via a separate approach into the sifter.

[0010] Advantageously, the cross-section d_1 of the sifter in the region of the upper approach is smaller than the cross-section d_2 of the sifter in the region of the lower approach. Due to this construction according to the invention, there is an increase in the flow rate of the air in the region of the upper approach, so that components conducted through the upper approach into the sifter are sifted only slightly or not at all, but carried out of the sifter immediately, this being while mixing with the follow-on tobacco stream. This is particularly advantageous for the recirculation of already sifted tobacco, as the latter then does not place an unnecessary load on the sifter. Also, as a result of the introduction of components heavier than the tobacco through the upper approach, in spite of the high tare weight, these components are not sifted out due to the high flow rate on account of the reduced diameter or cross-section, but instead mix with the product stream introduced through the lower approach into the sifter.

[0011] Furthermore, the instant invention provides a method that, in addition to the above-noted features, includes mixing the product stream with at least one further component within the distributor device behind the store. By this method, a homogeneous and individually mixed product stream can be produced in a particularly favorable and efficient manner, as final mixing of the product stream required for manufacture of the tobacco stream is performed within the distributor device.

[0012] The present invention is directed to a distributor device that includes an input device for the input of a product stream, a preliminary distributor for distributing, measuring out and loosening the product stream, a store for receiving the product stream, an accumulating shaft, and a sifter for separating fractions of the product stream. The distributor device also includes a conveying element for transporting the product stream from the store to the accumulating shaft, and at least one external delivery device for delivery of at least one additional

component. The at least one external delivery device is arranged between the store and the sifter relative to a transport direction of the product stream.

[0013] According to a feature of the invention, the distributor device can be structured and arranged for loading a continuous cigarette-making machine.

[0014] In accordance with another feature of the instant invention, the accumulating shaft may be arranged in front of the sifter relative to the transport direction.

[0015] According to the invention, the accumulating shaft can be arranged behind the sifter relative to the transport direction.

[0016] Further, the sifter may be structured and arranged to separate fractions of the product stream that are to be processed and that are not to be processed.

[0017] Moreover, the external delivery device delivers the at least one additional component to the product stream into the distributor device.

[0018] In accordance with another feature of the invention, the external delivery device can deliver the at least one additional component into the product stream.

[0019] The distributor device can also include at least one additional store for receiving the at least one additional component. Further, at least one additional conveying element may be associated with the at least one additional store. The store and the at least one additional store can each be associated with separate conveying elements. The store and the at least one additional store may be arranged in front of the sifter relative to the transport direction of the product stream.

[0020] The sifter can include a common approach from the delivery device. The sifter may include a common approach from the store and from the at least one additional store.

[0021] In accordance with still another feature of the present invention, the sifter can include at least two approaches. The approaches are arranged one behind or above the other in the transport direction of the product stream. The approaches can include an approach for at least one additional store located above an approach

for the store. Further, a cross-section d_1 of the sifter in a region of the upper approach is smaller than a cross-section d_2 of the sifter in a region of the lower approach.

[0022] The distributor device can further include at least one further external delivery device positioned behind the sifter relative to the transport direction of the product stream. The at least one further external delivery device can be structured and arranged to deliver at least one further additive. The at least one further additive may be delivered into the product stream.

[0023] The present invention is directed to a method for loading a continuous cigarette-making machine. The method comprises introducing a product stream into a distributor device through an input device, distributing, measuring out and loosening of the product stream via a preliminary distributor, and storing the product stream in a store. The method further includes transporting the product stream via a conveying element from the store to one of an accumulating shaft and a sifter, sifting the product stream in the sifter, and mixing the product stream with at least one further component within the distributor device after the store relative to a transport direction of the product stream.

[0024] In accordance with a feature of the invention, the product stream may be sifted before being fed into the accumulating shaft.

[0025] According to another feature of the invention, the product stream can be sifted after being fed into the accumulating shaft.

[0026] Further, the product stream can be mixed with the at least one further component immediately before sifting. The at least one further component may be stored within the distributor device.

[0027] Moreover, the product stream may be mixed with at least one further component during sifting. The at least one further component can be stored within the distributor device.

[0028] The method can further include comprising delivering the product stream and the at least one further component to the sifter via separate approaches. Each

further component may be conducted into the sifter behind the product stream relative to the transport direction.

[0029] Further, the method can include mixing each further component with the product stream in a region at which the product stream exits the sifter.

[0030] In accordance with another feature of the invention, an air stream can flow within the sifter, and the speed of the air stream within the sifter is higher in the region at which the product stream exits the sifter than in a remainder of the sifter.

[0031] The method can also include adjusting a degree of sifting by altering positions of the approaches into the sifter.

[0032] According to still another feature of the instant invention, the product stream can be mixed with the at least one further component, which is delivered to the sifter via a common approach.

[0033] Moreover, the product stream and the at least one further component can be taken from different stores within the distributor device.

[0034] After sifting, the process can further include delivering at least one further additive to the mixture of the product stream and the at least one further component.

[0035] In accordance with still yet another feature of the present invention, the at least one further component and the product stream can be delivered to an accumulating shaft via separate approaches, and the product stream and the at least one further component may be mixed in the accumulating shaft.

[0036] Other exemplary embodiments and advantages of the present invention may be ascertained by reviewing the present disclosure and the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0037] The present invention is further described in the detailed description which follows, in reference to the noted plurality of drawings by way of non-limiting examples of exemplary embodiments of the present invention, in which

like reference numerals represent similar parts throughout the several views of the drawings, and wherein:

[0038] Figure 1 illustrates a side view of an exemplary embodiment of the distributor device according to the invention with the housing open, with two separate approaches to a sifter arranged in front of an accumulating shaft;

[0039] Figure 2 illustrates a side view of another embodiment of the distributor device with the housing open, with a common approach to a sifter arranged in front of an accumulating shaft;

[0040] Figure 3 illustrates a side view of still another embodiment of the distributor device with the housing open, with a common approach to a sifter arranged in front of a double accumulating shaft, as well as an additional store arranged behind the sifter; and

[0041] Figure 4 illustrates a side view of a further embodiment of the distributor device with the housing open, with a common approach to a sifter, in which the sifter is arranged behind an accumulating shaft.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0042] The particulars shown herein are by way of example and for purposes of illustrative discussion of the embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily understood description of the principles and conceptual aspects of the present invention. In this regard, no attempt is made to show structural details of the present invention in more detail than is necessary for the fundamental understanding of the present invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the present invention may be embodied in practice.

[0043] The distributor devices described in Figures 1 to 4, also referred to as distributors below, serve to measure out and sift the product stream usually delivered to them via an air stream, and, while mixing with at least one further

component, from the sifted material to form one or more tobacco streams which are then delivered to a continuous cigarette-making machine mounted behind.

[0044] A known distributor 10 includes as essential elements an input device 11 by which a product stream is introduced into distributor device 10, a preliminary distributor 12 for distributing, measuring out and loosening the product stream, a store 13 for receiving the product stream, a conveying element 14 for transporting the product stream from store 13 to an accumulating shaft 15 or 33. Optionally, in front of or behind accumulating shaft 15 or 33, relative to the direction of transport of the product stream, a sifter 16 or 32 is arranged, which serves for the separation of fractions of the product stream which are to be processed and not to be processed. Since distributors 10 of this kind are basically known, a detailed description of all the parts necessary for actual operation is dispensed with.

[0045] The direction of transport of the product stream device passage of the product stream and/or further additives and components through distributor 10, starting from input device 11, as far as accumulating shaft 15 or as far as sifter 32. The term "in front of or behind in the direction of transport of the product stream" is not related to the actual arrangement of individual parts within distributor 10, but instead describes the order in which the product stream and/or the additives and components flow through the parts or at what location the additives and components are delivered to the product stream.

[0046] In the exemplary embodiment according to Figure 1, input device 11 is designed as a so-called "loading chamber." Input device 11 can, however, also have several loading chambers through which the product stream is introduced into distributor device 10. Store 13 is arranged in front of sifter 16 in the region of conveying element 14 which is designed as a steep conveyor belt. Sifter 16 is arranged immediately following conveying element 14 in the direction of transport of the product stream, and so in this embodiment in front of accumulating shaft 15. Sifter 16 is designed as a zigzag sifter and forms part of an almost closed air circuit 17. All other known sifters can however be used as well.

[0047] In a lower region 18 of the sifter zone of sifter 16, unit 19 is arranged for producing an air stream. Sifter 16 in an upper region 20 is connected to a guide 21 that serves as a recirculation device 22 for the air circuit and as a delivery device 23 to accumulating shaft 15. The essentially vertically oriented sifter 16 has a first approach 24 which leads into sifter 16 within the sifter zone between lower region 18 and upper region 20. In the region of approach 24, conveying element 14 is arranged for input of the product stream into sifter 16. The position of approach 24 along the sifter zone is, however, freely selectable.

[0048] Above first approach 24, sifter 16 has a second approach 25. The number of approaches, however, is also freely selectable. Via second approach 25, single or several additional components or additives can now be fed into sifter 16. In the preferred embodiment, in the region of approach 25 is arranged a further conveying element 26 which takes the or each additional component or the additives from a second store 27 or further stores (not shown) arranged in front of sifter 16 in the direction of transport, and delivers it or them to sifter 16. Store 27 can be filled by an additional delivery device 28 of distributor device 10, wherein delivery device 28 can also be directly connected to second approach 25. Approaches 24 and 25 are arranged one beside or above the other, such that approach 25 is arranged in upper region 20 of sifting zone 16, so that the product stream flows past first approach 24 and then approach 25. In this upper region 20, cross-section d_1 of sifter 16 is smaller than cross-section d_2 of sifter 16 in the region of lower approach 24. The position of approaches 24 and 25 is, however, variable and not limited to the arrangement shown.

[0049] The embodiments described in Figures 2 to 4 are essentially constructed similarly to distributor device 10 illustrated in Figure 1, so that identical reference numbers have been given for the same parts. Distributor device 10 as shown in Figure 2, however, differs in that sifter 16 has only one approach 24 to sifter 16, such that the or each additional component or the additives from second store 27 on conveying element 26 is directed along a baffle plate 40 toward approach 24.

The device depicted in Figure 3 essentially corresponds to that illustrated in Figure 2, except that, behind sifter 16 and in front of accumulating shaft 15 (here constructed as a double accumulating shaft), relative to the direction of transport of the product stream, a further store 29 is arranged. Store 29 is preferably arranged immediately behind a cellular wheel chamber 30 that is connected in front of accumulating shaft 15 to be supplied with additional components or additives via a delivery device 31. Delivery device 31, which can be constructed, e.g., as a conveyor belt, pipe system or the like, can however also be directly connected to accumulating shaft 15. In distributor device 10 shown in Figure 4, a sifter 32 is arranged behind an accumulating shaft 33 in the direction of transport of the product stream. Accumulating shaft 33 has two approaches 34 and 35. In front of each approach 34 and 35 is arranged a conveying element 36 and 37 which serves to transport the product stream and additional components or additives from stores 38 and 39 to accumulating shaft 33. Stores 38 and 39 are supplied via delivery device 11 and 28 of distributor device 10. Alternatively, delivery device 28 could also be directly connected to approach 35.

[0050] The method for loading a continuous cigarette-making machine for the manufacture of one or more tobacco strings proceeds basically on the following principle. A first product stream which is formed from one or more tobacco components and/or further additives is delivered to the distributor device 10. Via one or more additional separate approaches, one or more additional components or additives can be introduced into the distributor device, which are then mixed with the product stream within the distributor device before or during sifting. In other words, the or each accumulating shaft is filled from at least two independent reservoirs.

[0051] The method is described in more detail with the aid of the embodiment in Figure 1. Store 13 is filled via input device 11 with a product stream which usually consists of a cut tobacco mixture. The tobacco is transported by periodically opening and closing suction pipe valves (not shown) by air flow into

one or more loading chambers of input device 11. After a request for tobacco from preliminary distributor 12, the tobacco passes by a measuring roller (also not shown) into store 13. The steep belt conveyor (conveying element 14) continuously conveys tobacco in portions into sifter 16. The tobacco from store 13 drops through approach 24 into the sifting zone of sifter 16. At the same time a component conveyed from store 27, e.g., cloves, drops through approach 25 into sifter 16. The or each additional component can also be conducted directly into sifter 16. The product stream taken from store 13, usually a tobacco mixture, is then mixed with the additional component or components into a homogeneous product stream within sifter 16 or immediately when the product stream leaves sifter 16. Due to the reduction of cross-section in region 20, the greater flow rate prevailing there contributes to the fact that the additional component is hardly sifted any more, or not at all, but immediately transported on in the direction of guide 21. In the event that, e.g., cloves are added as an additional component, they are not sifted out in spite of the greater weight compared with the tobacco, but are conveyed for mixing with the tobacco. In the event that, e.g., excess tobacco which has already been sifted in a previous circuit is added as an additional component, it is added to the product stream still to be sifted without sifting again within distributor device 10, and mixed with it. The product stream mixed in this way, now including a first product stream and at least one further component, is delivered via guide 21 to accumulating shaft 15, wherein the product stream is guided through the cellular wheel chamber 30. The air located in circuit 17 is delivered to sifter 16 again via recirculation device 22.

[0052] The method with reference to the embodiment in Figure 2 proceeds essentially exactly the same as the method already described above. However, the product stream is already mixed with one or more additional components or additives in front of sifter 16. The components coming from store 27 are passed via a baffle plate 40 into the region of approach 24 and mixed with the product stream coming from store 13 immediately before entry into sifter 16.

[0053] In the method with distributor device 10 as in Figure 3, in addition to the method described in connection with Figure 2, after sifting and before feeding of the product stream into accumulating shaft 15 a further component or further additives are introduced into the product stream and mixed with it.

[0054] The method with distributor device 10 as in Figure 4 proceeds in an order modified from the method described above. In fact, the product stream from store 38 is conducted directly into accumulating shaft 33, this being in the region of approach 34. The additional component is conducted from second store 39 via approach 35 into accumulating shaft 33, so that the product stream and the additional component are mixed, upon dropping down into the accumulating shaft in the region of lower approach 34, into a homogeneous stream which is then delivered to sifter 32.

[0055] It is noted that the foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention. While the present invention has been described with reference to an exemplary embodiment, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Changes may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects. Although the present invention has been described herein with reference to particular means, materials and embodiments, the present invention is not intended to be limited to the particulars disclosed herein; rather, the present invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims.